

**Health and Safety Plan**  
  
**for**  
  
**Troy Asbestos Property Evaluation (TAPE)**

**HEALTH AND SAFETY PLAN**

Troy Asbestos Property Evaluation

Contract No. : DEQ 402014-TO41  
:  
Date Prepared : 12/30/05  
Prepared by : Tetra Tech EM Inc. (Tetra Tech)  
  
Tech Project Manager : J. Edward Surbrugg, Ph.D.  
Telephone No. : (406) 442-5588

**REVIEWS AND APPROVALS**

**CLIENT NAME:**  
**CONTRACT NO.:**

We the undersigned have read and approve of the health and safety guidelines presented in this health and safety plan for on-site work activities for the Troy Asbestos Property Evaluation project.

Name	Signature	Date
------	-----------	------

Glynis Foulk  
Tetra Tech EM Inc. (Tetra Tech)  
Health and Safety Representative  
(916) 853-4561

J. Edward Surbrugg, Ph.D.  
Tetra Tech Project Manager

This certifies that Tetra Tech has assessed the type, risk level, and severity of hazards for the project and has selected appropriate personal protective equipment for site personnel in accordance with Occupational Safety and Health Administration Title 29 of the *Code of Federal Regulations*, Part 1910.132.

Certified by

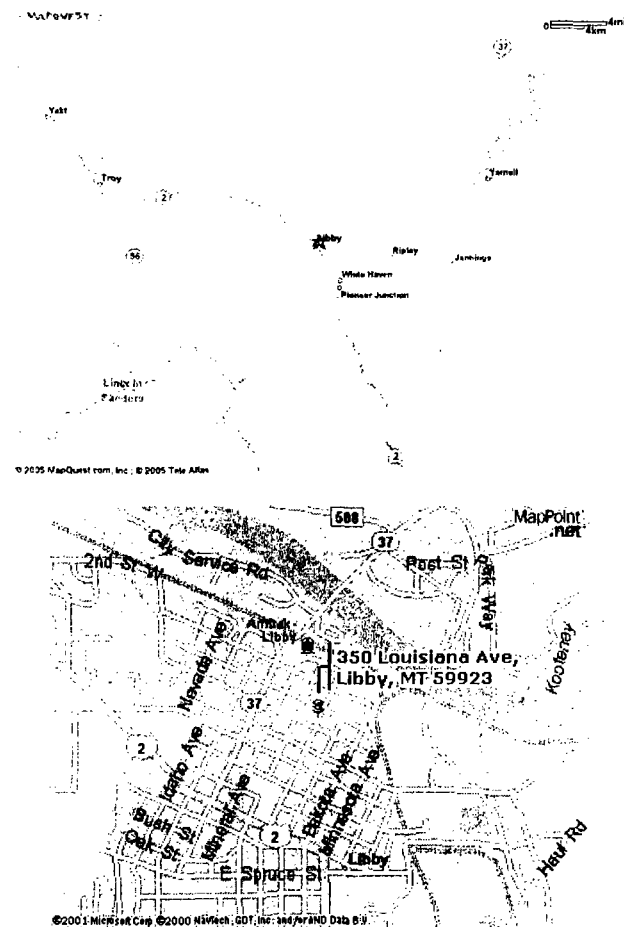
Glynis Foulk  
Tetra Tech  
Technical Reviewer

**EMERGENCY INFORMATION  
EMERGENCY CONTACTS AND ROUTE TO HOSPITAL**

Emergency Contact	Telephone No.
U.S. Coast Guard National Response Center	(800) 424-8802
Montana Department of Emergency Services	(406) 431-0411
InfoTrac Chemical Monitoring System	(800) 535-5053
Fire Department	911
Police Department	911
Tetra Tech EM Inc. Personnel:	
Human Resource Development: Amy Clark	(626) 351-4664
Health and Safety Representative: Glynis Foulk	(678) 775-3094
Office Health and Safety Coordinator: Sandra Hertweck	(406) 442-5588, ext. 221
Project Manager: J. Edward Surbrugg	(406) 442-5588, ext. 230
Site Safety Coordinator: Mark Stockwell	(208) 263-4524
Client Contact: Catherine LeCours	(406) 841-5040
Client Title: Montana DEQ Project Officer	
<b>Medical Emergency</b>	
Hospital Name:	St. John's Lutheran Hospital
Hospital Address:	350 Louisiana Avenue Libby, MT 59923
Hospital Telephone No.:	General – 406-293-0100      Emergency – 911
Ambulance Telephone No.:	911
Route to Hospital: (see next page, hospital route map)	
1. Routes will differ from each sample site.	

**Note:** This sheet must be posted on site.

**EMERGENCY INFORMATION  
HOSPITAL ROUTE MAP**



**Note:** This sheet must be posted on site.

## EMERGENCY INFORMATION

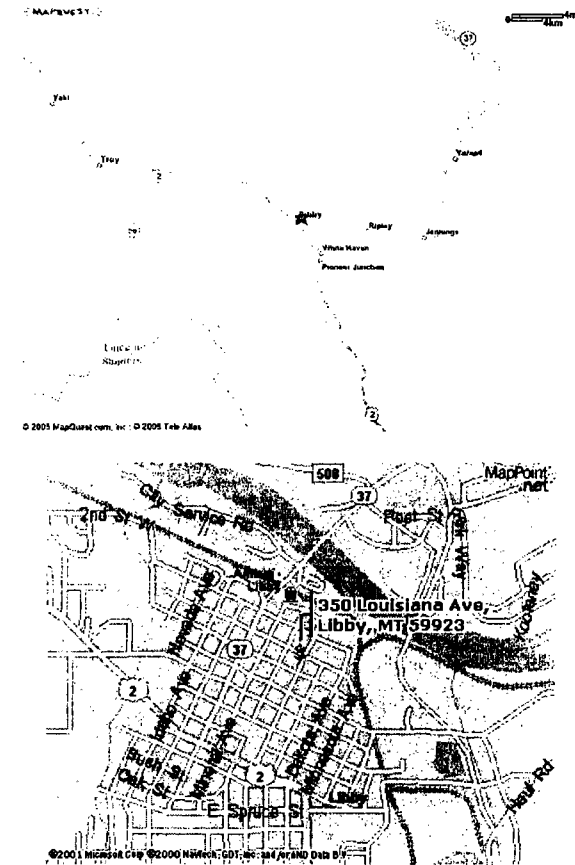
### EMERGENCY CONTACTS AND ROUTE TO HOSPITAL

Medical Emergency (secondary – use for major emergency only)	
Hospital Name:	St. John's Lutheran Hospital
Hospital Address:	350 Louisiana Avenue, Libby, MT 59923
Hospital Telephone No.:	Emergency – 911 or General – 406-293-0100
Ambulance Telephone No.:	911
Route to Hospital: (see next page hospital route map)	
1. Routes will differ from each sample site.	

*But you could travel  
lines to Hwy 2 on the  
X miles to Libby  
Can get better directions*

## EMERGENCY INFORMATION

### HOSPITAL ROUTE MAP



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## 1.0 INTRODUCTION

This document addresses items specified under Occupational Safety and Health Administration (OSHA) Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.120 (b), "Final Rule." This health and safety plan (HASP) will be available to all on-site personnel who may be exposed to hazardous on-site conditions, including Tetra Tech EM Inc. (Tetra Tech) and subcontractor personnel, and all site visitors and regulatory agency representatives. The site-specific health and safety provisions in this document have been developed for use during the Troy Asbestos Property Evaluation (TAPE) inspection and sampling.

This HASP defines requirements and designates protocols to be followed during the TAPE inspection and sampling. All personnel on site, including Tetra Tech and subcontractor employees and site visitors, must be informed of site emergency response procedures and any potential health or safety hazards associated with on-site activities. This HASP summarizes potential hazards and defines protective measures planned for activities at the site.

This plan must be reviewed and approved by the Tetra Tech health and safety representative (HSR) or a designee and the Tetra Tech project manager (see the Reviews and Approvals form after the contents in this document). All personnel must sign the Compliance Agreement form in Appendix A before they enter the site. Protocols established in this HASP are based on site conditions and health and safety hazards known or anticipated to be present and on available site data. This plan is intended solely for use during proposed activities described in the corresponding site-specific work plan. Specifications are subject to review and revision based on actual conditions encountered in the field during site activities. The Tetra Tech project manager and the Tetra Tech HSR must approve significant revisions to this plan. Tetra Tech employees must also follow safety requirements taught during safety training and described in the Tetra Tech, Inc., "Health and Safety Manual" (1999).

## 2.0 HEALTH AND SAFETY PLAN ENFORCEMENT AND PERSONNEL

This section describes responsibilities of project personnel, summarizes requirements for subcontractors and visitors who wish to enter the site during the survey and sampling, and discusses HASP enforcement.

## 2.1 PROJECT PERSONNEL

The following personnel and organizations are associated with planned activities at the site. The organizational structure will be reviewed and updated as necessary during the course of the project.

<u>Name/Title</u>	<u>Responsibility</u>	<u>Telephone No.</u>
<b>Client Representative:</b>		
Ms. Catherine LeCours	Montana Department of Environmental Quality (DEQ) Representative	(406) 841-5040

### **Tetra Tech Personnel:**

J. Edward Surbrugg	TAPE Project Manager	(406) 442-5588 x 230
Brian Antonioli	Contract Manager	(406) 442-5588 x 235
Mark Stockwell	Site Safety Coordinator (SSC)	(208) 263-4524
Mark Stockwell	Field Team Leader	(208) 263-4524

The Tetra Tech project manager, contract manager, SSC, and field team leader will be responsible for implementation and enforcement of the provisions of this HASP, including completion of all applicable forms provided as appendices to this health and safety plan. Their duties and the expectations for Tetra Tech employees are described in the following sections.

### **2.1.1 Project Manager and Field Manager**

The Tetra Tech project manager has ultimate responsibility for implementing the requirements set forth in this HASP. Some of this responsibility may be achieved through delegation to site-dedicated personnel who report directly to the project manager. The project manager shall regularly confer with site personnel on compliance with safety and health requirements.

The Tetra Tech field team leader will oversee and direct field activities and has day-to-day responsibility for implementing the HASP. The field manager will report directly to the project manager any health and safety-related issues.

### 2.1.2 Site Safety Coordinator

The Tetra Tech SSC will be appointed by the project manager and will be responsible for field implementation of tasks and procedures contained in this HASP, including air monitoring, establishing a decontamination protocol, and ensuring that all personnel working on site have signed the Daily Tailgate Safety Meeting form (Form HST-2) and the Compliance Agreement (Form HSP-4) (see Appendix A). The SSC will have advanced field work experience and be familiar with health and safety requirements specific to the project. The SSC will also maintain the Daily Site Log (Form SSC-1 in Appendix A).

### 2.1.3 Health and Safety Representative

The Tetra Tech HSR is responsible for administration of the company health and safety program. The HSR will act in an advisory capacity to project managers and site personnel for project-specific health and safety issues.

### 2.1.4 Tetra Tech Employees

Tetra Tech employees are expected to fully participate in implementing the site HASP by obtaining necessary training, attending site safety meetings, always wearing designated personal protective equipment (PPE), complying with site safety and health rules, and advising the Tetra Tech SSC of health and safety concerns at the site.

## 2.2 SUBCONTRACTORS

Subcontractors will follow and adhere to the same guidelines stated in Section 2.1.4

## 2.3 VISITORS

All site visitors will be required to read the HASP and sign the Compliance Agreement form (see Appendix A). Visitors will be expected to comply with relevant OSHA requirements. Visitors will also be expected to provide their own PPE as required by the HASP. Visitors who have not met OSHA requirements for training, medical surveillance, and PPE are not permitted to enter areas where exposure to hazardous materials is possible.

## 2.4 HEALTH AND SAFETY PLAN ENFORCEMENT

This HASP applies to all site activities and all personnel working on the TAPE project. HASP enforcement shall be rigorous. Violators of the HASP will be verbally notified on first violation, and the Tetra Tech SSC will note the violation in a field logbook. On a second violation, the violator will be notified in writing, and the Tetra Tech project manager and the violator's supervisor will be notified. A third violation will result in a written notification and the violator's eviction from the site. The written notification will be sent to human resources development and the HSR.

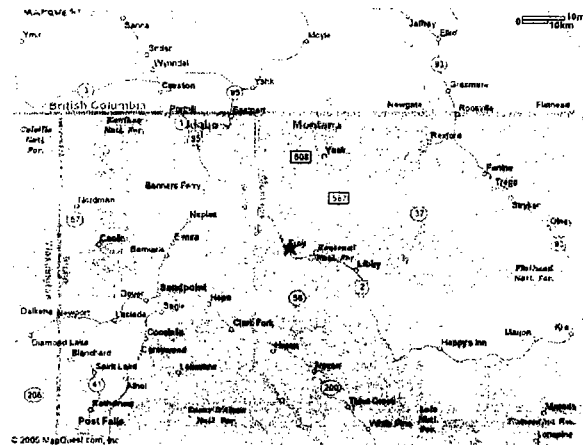
Personnel will be encouraged to report to the SSC any conditions or practices that they consider detrimental to their health or safety or that they believe violate applicable health and safety standards. These reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment are obligated to remove themselves from the area or the hazardous condition and warn all other personnel of the source of the danger. The hazardous condition or matter will be brought to the immediate attention of the SSC for resolution.

At least one copy of this HASP will be available to all site personnel at all times. The SCC will discuss minor changes in HASP procedures at the beginning of each workday at the daily tailgate safety meeting. Significant plan revisions must be discussed with the HSR and project manager.

## 3.0 SITE BACKGROUND

The TAPE inspection and sampling project will include collecting samples of dust and soil from private and public property to evaluate the magnitude and extent of asbestos contamination and develop viable remedial alternatives. The following sections describe the TAPE site, its history, and activities planned for this project. The location of Troy, Montana, can be found in Figure 1.

FIGURE 1 – SITE LOCATION



### 3.1 SITE DESCRIPTION

Troy, Montana, is located 18 miles from Libby, Montana. Through 1990, a vermiculite mine and associated processing operations in Libby produced a large amount of the world's supply of vermiculite. The vermiculite deposit is contaminated with a form of amphibole asbestos (Libby amphibole). Asbestos is a known carcinogen and is associated with a multitude of respiratory health effects, including asbestosis, lung cancer, and mesothelioma. For decades, contaminated vermiculite and waste materials were ubiquitous in the community while the mine operated and after its closure. Many of the mine workers lived in Troy and commuted to the mine to work because Troy is close to Libby. Workers were exposed to contaminated materials at the mine and processing facilities; they transported contaminated dust to their homes on clothes and equipment; and vermiculite and contaminated waste rock in varying forms was used in soils (as fill or an amendment), construction materials, and for insulation all around the town.

In 1999, U.S. Environmental Protection Agency (EPA) Region 8 dispatched an emergency response team to investigate in response to media reports that described a high rate of asbestos-related deaths in Libby. Originally believed to be a problem limited to the mine workers, the scope has increased. Subsequent environmental investigations have found many areas in Libby with LA contamination. EPA began Superfund emergency response removal actions in Libby in 2000 that are ongoing through 2007. Properties in Troy are being investigated to evaluate whether LA-contaminated vermiculite has been transported to these sites and at concentrations that would pose health risks to the occupants.

### 3.2 PLANNED ACTIVITIES

Activities to be performed during the TAPE include the following...

**Indoor Inspections:** The two-person sampling team will visually inspect each structure for the presence of vermiculite-containing insulation (VCI).

**Indoor dust sampling:** Dust samples will be collected using microvac sampling techniques in all primary and secondary structures.

**Outdoor Inspection:** All areas of a property that are not covered with structures or special use areas will be inspected for vermiculite product in soil and surfacing materials.

**Outdoor Soil Sampling:** After conducting the visual inspection of the property, the sampling team will collect soil samples.

These tasks are described in detailed in Section 4 of the TAPE work plan.

#### 4.0 EVALUATION OF SITE-SPECIFIC HAZARDS

Field activities and physical features of the site may expose field personnel to a variety of hazards. This section provides information on potential hazards related to site activities and the nature of effects from hazardous materials.

#### 4.1 CHEMICAL HAZARDS

Tremolite-actinolite asbestos is the only potentially hazardous substance anticipated to be encountered during site activities. Potential routes of exposure, exposure limits, and the toxic characteristics of asbestos are listed in Table 4-1. The primary route of exposure is inhalation; however, secondary potential routes of exposure include dermal (skin) contact and ingestion. Asbestos may also contaminate equipment, vehicles, instruments, and personnel. The overall health threat from exposure to asbestos is uncertain because (1) actual concentrations that personnel could be exposed to cannot be predicted, (2) the actual duration of exposure is unknown, and (3) the effects of low-level exposure to a mixture of chemicals or asbestos cannot be predicted. However, Tetra Tech believes that the potential for high-level exposure is limited.

Specific information on potential chemical hazards at the site is provided in Table 4-1. Table 4-2 provides a task hazard analysis of the activities planned and listed in Section 3.2.

Tetra Tech will not bring any potentially hazardous materials to the site during the field activities. Because of the nature of asbestos sampling, all PPE and monitoring equipment can be decontaminated using soap and water. Air monitoring equipment to be used during this project will be calibrated without the use of hazardous materials.

TABLE 4-1  
POTENTIAL CHEMICAL HAZARDS  
TAPE INSPECTION AND SAMPLING PROJECT

Chemical	Exposure Limits and IDLH Level	Exposure Routes	Toxic Characteristics
Asbestos	OSHA PEL: 0.1 fiber/cm <sup>3</sup> (8 hour TWA) ACGIH TLV: 0.1 fiber/cm <sup>3</sup> IDLH: Not Established	Inhalation (primary), ingestion, skin or eye contact	Asbestosis, lung cancer, mesothelioma

Notes:

ACGIH American Conference of Governmental Industrial Hygienists  
IDLH Immediately dangerous to life or health  
cm<sup>3</sup> Cubic centimeter  
OSHA Occupational Safety and Health Administration  
PEL Permissible exposure limit  
ppm Part per million  
TLV Threshold limit value  
TWA Time weighted average

Sources:

ACGIH. "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.  
National Institute for Occupational Safety and Health. 1997. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.



**TABLE 4-2**  
**TASK HAZARD ANALYSIS**  
**TAPE Inspection and Sampling Project**

Task	Potential Hazard	Controls	Initial Level of Protection	Upgraded Level of Protection
Task 1 – Interior Attic Evaluations and dust sampling	Potential asbestos exposure. Physical hazards include confined space entry; and slip, trip, fall, and overhead hazards. Risks associated with ladder use. Risks associated with falls between roof trusses.	Use of buddy system at all times, use of flashlights when necessary, hazard awareness. Sampling will be conducted to limit the potential for exposure. Sample areas will be wetted before samples are collected, when necessary. Performance of personal air monitoring at selected locations. Follow Safe Work Practices (SWP).	Level C protection when accessing all attic spaces	Potential for upgrade to level C protection may be necessary using P-100 cartridges. Full or ½ face respirator can be used. Decision to upgrade to be made by the SSC/field manager based on site conditions, monitoring results, and presence of friable asbestos.
Task 2 – Exterior yard and open area inspections and soil sampling	Potential asbestos exposure. Physical hazards include slip, trip, and falls.	Use of buddy system and hazard awareness. Follow SWPs.	Level D protection	Decision to upgrade to be made by the SSC/Field Manager based on site conditions, monitoring results, and presence of friable asbestos.

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The following steps will be taken to reduce the potential for inhaling asbestos:

- Personnel will avoid sampling methods and procedures that would render nonfriable asbestos-containing material (ACM) friable.
- The level of PPE shall be upgraded from level D to level C at any time that sampling conditions warrant, as determined by the SSC or field manager.

#### 4.2 PHYSICAL HAZARDS

Physical hazards associated with site activities present a potential threat to on-site personnel. Dangers are posed by slippery surfaces, unseen obstacles, poor illumination, use of ladders, and low overhead clearance.

Injuries resulting from physical hazards can be avoided by using safe work practices (SWP). To maintain a safe workplace, the SSC will conduct and document regular safety inspections and will make sure that all Tetra Tech workers and visitors are informed of any potential physical hazards related to the site.

Physical hazards that have been identified at this site include the following:

- Use of ladders and other equipment to access attics and areas for sample collection
- Trips, slips, falls in yards and open areas
- Heat stress
- Cold stress
- Fall hazard (from ladders and through roof trusses in attics)
- Potential confined space entry – no permits are anticipated to be necessary for sampling, however

#### 5.0 TRAINING REQUIREMENTS

All on-site personnel who may be exposed to hazardous conditions, including Tetra Tech and subcontractor personnel and site visitors who will participate in on-site activities, will be required to meet training requirements outlined in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response." All personnel and visitors entering the site will be required to review this HASP and sign the Compliance Agreement form (HSP-4), and site workers will be required to sign the Daily Tailgate Safety Meeting form (HST-2) (see Appendix A).

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Personnel collecting asbestos samples will, at a minimum, be licensed asbestos inspectors in the State of Montana and be 40-hour HAZWOPER trained.

Before on-site activities begin, the Tetra Tech SSC will present a briefing for all personnel who will participate in on-site activities. The following topics will be addressed during the prework briefing:

- Names of the SSC and the designated alternate
- Site history
- Tasks
- Hazardous chemicals that may be encountered on site
- Physical hazards that may be encountered on site
- PPE, including type or types of respiratory protection to be used for work tasks
- Training requirements
- Action levels and situations requiring upgrade or downgrade of level of protection
- Site control measures, including site communications, and SWPs
- Decontamination procedures
- Emergency communication signals and codes
- Personnel exposure and accident emergency procedures (in case of falls, exposure to hazardous substances, and other hazardous situations)
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before on-site activities begin will also be discussed during the pre-work briefing.

Issues that arise during on-site activities will be addressed during tailgate safety meetings to be held daily before the workday or shift begins that will be documented in the Daily Tailgate Safety Meeting form (Form HST-2 in Appendix A). Any changes in procedures or site-specific health and safety-related matters will be addressed during these meetings.

## 6.0 PERSONAL PROTECTION REQUIREMENTS

The levels of PPE to be used for work tasks during the TAPE will be selected based on known or anticipated physical hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrices. The following sections describe protective equipment and clothing; reassessment of protection levels; limitations of protective clothing; and respirator selection, use, and maintenance.

### 6.1 PROTECTIVE EQUIPMENT AND CLOTHING

Personnel will wear protective equipment when (1) site activities involve known or suspected contamination; (2) site activities may generate asbestos particulates; or (3) direct contact with hazardous materials may occur. The anticipated levels of protection selected for use by field personnel during site activities are listed in Table 4-2, Task Hazard Analysis. Based on the anticipated hazard level, personnel will initially perform field tasks in level D protection.

If site conditions or the results of air monitoring during on-site activities warrant a higher level of protection, all field personnel will immediately notify the Tetra Tech SSC. Based on the initial site walk-through and conditions encountered during sample collection, a PPE upgrade to level C protection is anticipated in some of the areas to be sampled. This PPE upgrade will typically occur whenever vermiculite-containing insulation (VCI) or Libby vermiculite (LV) is encountered. Equipment and clothing required for level D and level C protection are described below.

- Level D
  - Coveralls or work clothes, if applicable
  - Chemical-resistant clothing (such as Tyvek or Saranex coveralls)
  - Disposable gloves (latex or vinyl), if applicable
  - Work gloves, if applicable
  - Boots with steel-toe protection and steel shanks
  - Disposable boot covers or chemical-resistant outer boots, if applicable
  - Safety glasses or goggles
  - Hard hat (face shield optional)

- Hearing protection (for areas with a noise level that exceeds 85 decibels on the A-weighted scale)

- Level C

- Coveralls or work clothes, if applicable
- Chemical-resistant clothing (such as Tyvek or Saranex coveralls)
- Outer gloves (neoprene, nitrile, or other), if applicable
- Disposable inner gloves (latex or vinyl)
- Boots with steel-toe protection and steel shanks
- Disposable boot covers or chemical-resistant outer boots
- Full- or half-face, air-purifying respirator with National Institute for Occupational Safety and Health (NIOSH)-approved cartridges to protect against organic vapors, dust, fumes, and mists. (Cartridges used for gas and vapors must be replaced in accordance with the change-out schedule described in the Respiratory Hazard Assessment form [Form RP-2] in Appendix C.) P-100 cartridges will be used.
- Safety glasses or goggles (with a half-face respirator only)
- Hard hat (face shield optional)
- Hearing protection (for areas with a noise level that exceeds 85 decibels on the A-weighted scale)

## 6.2 REASSESSMENT OF PROTECTION LEVELS

PPE levels will be upgraded or downgraded based on a change in site conditions or findings of the investigation. Hazards will be reassessed when a significant change in site conditions occurs. Some indicators of the need for reassessment are as follows:

- Commencement of a new phase of work, such as the start of a significantly different sampling activity or work that begins on a different portion of the site
- Potential for release of amphibole asbestos
- A change in tasks during a work phase
- A change of season or weather
- Temperature extremes or individual medical considerations that would limit the effectiveness of PPE
- Discovery of contaminants other than were previously identified
- A change in ambient levels of airborne contaminants (see the action levels listed in Table 8-1)

- A change in work scope that affects the degree of contact with contaminated media

## 6.3 LIMITATIONS OF PROTECTIVE CLOTHING

PPE clothing ensembles designated for use during site activities have been selected to protect against contaminants at known or anticipated on-site concentrations and physical states. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any protective clothing protect against all types of chemicals. Permeation of a chemical through PPE depends on the contaminant concentration, environmental conditions, the physical condition of the protective garment, and the resistance of the garment to the specific contaminant. Chemical permeation may continue even after the source of contamination has been removed from the garment.

All site personnel will use the following procedures to obtain optimum performance from PPE.

- When chemical-protective coveralls become contaminated, don a new, clean garment after each rest break or at the beginning of each shift.
- Inspect all clothing, gloves, and boots both before and during use for the following:
  - Imperfect seams
  - Nonuniform coatings
  - Tears
  - Poorly functioning closures
- Inspect reusable garments, boots, and gloves both before and during use for visible signs of chemical permeation, such as the following:
  - Swelling
  - Discoloration
  - Stiffness
  - Brittleness
  - Cracks
  - Punctures
  - Abrasions

Reusable gloves, boots, or coveralls that exhibit any of the characteristics listed above must be discarded. Reusable PPE will be decontaminated in accordance with procedures described in Section 10.0 and will be neatly stored in the support zone away from work zones.

## 6.4 RESPIRATOR SELECTION, USE, AND MAINTENANCE

Tetra Tech personnel will be informed of the proper use, maintenance, and limitations of respirators during annual health and safety refresher training and the prework briefing. Any on-site personnel who will use a tight-fitting respirator must pass a qualitative fit test for the respirator that follows the fit testing protocol provided in Appendix A of the OSHA respirator standard (29 CFR 1910.134). Fit testing must be repeated annually or when a new type of respirator is used.

Respirators are selected based on the assessment of the nature and extent of hazardous atmospheres anticipated during field activities. This assessment includes a reasonable estimate of employee exposure to respiratory hazards and identification of each contaminant's anticipated chemical form and physical state.

A respiratory hazard assessment has been conducted for each task that will require use of a respirator during the TAPE project. The results of this assessment are documented in the Respiratory Hazard Assessment form (Form RP-2), which has been approved by the HSR. The completed Form RP-2 is included in Appendix C and defines respiratory protection requirements for the project. Amendments to this HASP and to Form RP-2 will be discussed during daily tailgate safety meetings.

When the atmospheric contaminant is identified and its concentration is known or can be reasonably estimated, respiratory protection options include the following:

- An atmosphere-supplying respirator (air-line or SCBA)
- An air-purifying respirator equipped with a NIOSH-certified, end-of-service-life indicator (ESLI) for the identified contaminant. If no ESLI is available, a change-out schedule for cartridges must be developed based on objective data or information. The HSR will evaluate respirator cartridge selection and change-out schedules during the respiratory hazard assessment. The Respiratory Hazard Assessment, Form RP-2, will describe the information and data used as the basis for the cartridge change-out schedule and the proposed change schedule.

For protection against particulate contaminants including friable asbestos, approved respirators can include the following:

- An atmosphere-supplying respirator
- A respirator equipped with a filter certified by NIOSH under 32 CFR Part 11 or 42 CFR Part 84 as a P100 filter (formerly known as a high-efficiency particulate air [HEPA] filter)

A full- or half-face, air-purifying respirator equipped with NIOSH-approved cartridges or filters will be selected to protect against particulates, vapors, gases, and aerosols for any tasks performed in level C PPE.

Air-purifying respirators will be used only in conjunction with breathing-space air monitoring, which must be conducted in adherence to the action levels outlined in Table 8-1. Air-purifying respirators will be used only when they can protect against the substances encountered on site.

Factors that would preclude use of level C and air-purifying respirators are as follows:

- Oxygen-deficient atmosphere (less than 19.5 percent oxygen)
- Concentrations of substances that may be immediately dangerous to life and health
- Confined or unventilated areas that may contain airborne contaminants not yet characterized
- Unknown contaminant concentrations or concentrations that may exceed the maximum use levels for designated cartridges documented in the selected cartridge manufacturer's instructions
- Unidentified contaminants
- High relative humidity (more than 85 percent, which reduces the sorbent life of the cartridges)
- Respirator cartridges with an undetermined service life

Use, cleaning, and maintenance of respirators are described in SWP 6-27, Respirator Cleaning Procedures, and SWP 6-28, Safe Work Practices for Use of Respirators. These SWPs are included in Appendix B.

## 7.0 MEDICAL SURVEILLANCE

The following sections describe Tetra Tech's medical surveillance program, including health monitoring requirements, site-specific medical monitoring, and medical support and follow-up requirements. Procedures documented in these sections will be followed for all activities during the TAPE project. Additional requirements are defined in the Tetra Tech, Inc., "Health and Safety Manual."

## 7.1 HEALTH MONITORING REQUIREMENTS

All Tetra Tech and subcontractor personnel involved in on-site activities for the TAPE project must participate in a health monitoring program as required by 29 CFR 1910.120(f). Tetra Tech has established a health monitoring program with WorkCare, Inc., of Orange, California. Under this program, Tetra Tech personnel receive baseline and annual or biennial physical examinations consisting of the following:

- Complete medical and work history
- Physical examination
- Vision screening
- Audiometric screening
- Pulmonary function test
- Resting electrocardiogram
- Chest x-ray (required once every 3 years)
- Blood chemistry, including hematology and serum
- Urinalysis
- For sampling asbestos licensed workers will meet the medical monitoring requirements of their licenses

Tetra Tech receives a copy of the examining physician's written opinion for each employee after post-examination laboratory tests have been completed; the Tetra Tech employee also receives a copy of the written opinion. This opinion includes the following information (in accordance with 29 CFR 1910.120(f)(7)):

- The results of the medical examination and tests
- The physician's opinion as to whether the employee has any medical conditions that would place the employee at an increased risk of health impairment from work involving hazardous waste operations or during an emergency response
- The physician's recommended limitations, if any, on the employee's assigned work; special emphasis is placed on fitness for duty, including the ability to wear any required PPE under conditions expected on site (for example, temperature extremes)

- A statement that the employee has been informed by the physician of the medical examination results and of any medical conditions that require further examination or treatment

All subcontractors must have health monitoring programs conducted by their own clinics in compliance with 29 CFR 1910.120(f). Any visitors or observers at the site will be required to provide records in compliance with 29 CFR 1910.120(f) before they can enter the site.

## 7.2 MEDICAL SUPPORT AND FOLLOW-UP REQUIREMENTS

All employees are entitled to and encouraged to seek medical attention and physical testing as a follow-up to an injury that requires care beyond basic first aid or to possible exposure above established exposure limits. These injuries and exposures must be reported to the HSR. Depending on the type of injury or exposure, follow-up testing, if required, must occur within 24 to 48 hours of the incident. It will be the responsibility of the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects. The Tetra Tech SSC must complete the Accident and Illness Investigation Report (Form AR-1 in Appendix A) in the event of an accident, illness, or injury. A copy of this form must be forwarded to the HSR for use in determining whether the incident should be recorded and to be included in Tetra Tech's medical surveillance records.

## 8.0 ENVIRONMENTAL MONITORING AND SAMPLING

Environmental monitoring or sampling will be conducted to assess personnel exposure levels as well as site or ambient conditions and to establish appropriate levels of PPE. The following sections discuss initial and background air monitoring, personal monitoring, ambient air monitoring, monitoring parameters and devices, use and maintenance of survey equipment, thermal stress monitoring, and noise monitoring. Site-specific air monitoring requirements and action levels are provided in Table 8-1.

### 8.1 INITIAL AND BACKGROUND AIR MONITORING

Initial air monitoring of a typical work area will be performed at the beginning of the field sampling project to document airborne fiber levels in attic spaces that contain VCI or LV. Initial exposure assessments will be required for personnel who participate in the TAPE project. Personal air monitoring will be required during the initial phase of the TAPE to document airborne exposures. The assessments must be used to document typical exposures during specific types of field activities to establish the PPE

TABLE 8-1  
SITE-SPECIFIC AIR MONITORING REQUIREMENTS AND ACTION LEVELS

Contaminant or Hazard	Task	Monitoring Device	Action Level	Monitoring Frequency	Action*
Asbestos	Tasks 1 and 2	Gilair-5 Air Sampler (personal)	<one half of PEL or TLV	Select locations - presence of friable asbestos	Results will be received the day after sampling Work practices will be changed accordingly

Notes:

< Less than  
 PEL Permissible exposure limit  
 TLV Threshold limit value  
 Refer to Table 4-2 for specific types of gloves, chemical resistant clothing, respirators, and cartridges

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required. This exposure assessment will be conducted for each two-person field sampling team. The exposure levels must be documented before the levels of PPE required during the work can be downgraded. The assessments must also be conducted using personal air sampling whenever there is a change in working conditions.

## 8.2 PERSONAL MONITORING

The employees working closest to a source of contamination have the highest likelihood of exposure to airborne contaminant concentrations that may exceed established exposure limits. Therefore, the workers who are closest to a source of contaminant generation will be selectively monitored during site activities. Personal monitoring will be conducted in the breathing zone and, if a worker is wearing respiratory protective equipment, outside the face piece. The breathing zone air will be monitored at select locations, such as in the presence of friable asbestos.

Air monitoring will be performed to calculate the airborne fiber concentration to ensure that employee exposure remains below the prescribed permissible exposure limit (PEL) or excursion limit. The worker's exposure will be measured by first collecting an air sample from within the breathing zone (within 12 inches from the nose) throughout an entire workshift. This measurement usually necessitates that workers wear the pump near the waist. The personal air monitoring will be evaluated based on the different work activities that are being conducted. A representative set of air samples will be collected during activities that represent typical field days during the TAPE.

The sampling pump flow rates will be between 0.5 liters/minute and 2.5 liters/minute when using a 25-millimeter cassette. Once this sample is analyzed, the results shall be used to calculate the average level of exposure during the complete workshift (the time weighted average, TWA). The TWA is calculated as follows:

$$TWA = \frac{C_1 T_1 + C_2 T_2 + C_3 T_3}{T_1 + T_2 + T_3}$$

T = sample times (duration of exposure in minutes or hours)

C = airborne asbestos fiber concentration (in fibers per cubic centimeter, f/cc)

The TWA results will then be used for comparison to the PEL and to evaluate compliance with permissible exposure limits as established by OSHA. They will also be used to dictate which type of respiratory protection is required to ensure that the PEL is not exceeded.

Personal air samples will also be collected and analyzed in the manner described above for comparison to the exposure limit. The samples will be collected for 30 minutes during operations.

### **8.3 MONITORING PARAMETERS AND DEVICES**

The following sections below briefly describe the use and limitations of instruments used to monitor for asbestos, combustible atmospheres, percent oxygen, and particulates. Site-specific air monitoring requirements and action levels are listed in Table 8-1.

All monitors will be calibrated in accordance with manufacturer recommendations at the beginning of every workday, if possible. Calibration results along with air monitoring data will be recorded in the field logbook.

#### **8.3.1 Asbestos**

Air monitoring will be conducted selectively during sampling to provide information on exposure and identify the need for upgrades from level D PPE to level C PPE. In addition, air monitoring will be conducted to make certain that asbestos is not being released to the areas used by workers as a result of sampling.

Work during the TAPE will be initially conducted in level D PPE; however, level C PPE will be required whenever attic access is required or whenever VCI or LV is sampled. The action level for sampling activities is one-half the PEL (0.05 f/cc). Additionally, upgrade to level C PPE will also be based on the material sampled and at the discretion of the SSC. Personal air monitoring for particulates will be conducted and analyzed by a laboratory. Laboratory results will be received post exposure (less than 1 day) to assess sampling conditions and change PPE accordingly.

#### **8.3.2 Particulates**

Friable asbestos is anticipated to be encountered during sampling. Other particulates, such as mineral wood, fiberglass, and other insulating materials, may be encountered in attic areas but are not known.

Particulate air monitoring is the process of measuring the fiber content of a known volume of air collected during a specific period of time. The acceptable procedure for airborne asbestos measurement for personal exposure monitoring is phase contrast microscopy (PCM) using the OSHA reference method specified in Appendix A of 29 CFR 1926.1101. This NIOSH 7400 Method is also acceptable for measuring airborne fiber levels in area samples. The OSHA asbestos regulations, which contain the PEL, were written to regulate asbestos-related activities typically found within industrial or construction settings. OSHA assumes that, the majority of the airborne fibers in these settings will be asbestos. In line with this assumption, the OSHA PEL is based on total airborne fiber exposures and not specifically airborne asbestos fibers.

The acceptable procedure for airborne asbestos measurement by transmission electron microscopy (TEM) is the method EPA specified in 40 CFR 763, Appendix A to Subpart E, Interim Transmission Electron Microscopy Analytical Methods. TEM sampling provides greater analytical sensitivity and can differentiate between asbestos and non-asbestos fibers. TEM sampling will be limited during the TAPE. TEM samples will be collected only if PCM samples cannot be analyzed because of overloading from nuisance particulates, or when fibers must be differentiated.

### **8.4 USE AND MAINTENANCE OF SURVEY EQUIPMENT**

All personnel using field survey equipment must have training in its operation, limitations, and maintenance. Maintenance and internal or electronic calibration will be performed in accordance with manufacturer recommendations by personnel who are familiar with the devices before they are used on site. Repairs, maintenance, and internal or electronic calibration of these devices will be recorded in an equipment maintenance logbook. Results of routine calibration will be recorded on daily air sampling data sheets.

## 8.5 THERMAL STRESS MONITORING

Heat stress and cold stress are common and serious threats at hazardous waste sites. SWPs 6-15 and 6-16 discuss heat and cold stress and include monitoring methods appropriate for the season and location of work (see Appendix B).

## 9.0 SITE CONTROL

Site control is an essential component in HASP implementation. The following sections discuss measures and procedures for site control, such as on-site communications, site control zones, site access control, site safety inspections, and SWPs.

### 9.1 ON-SITE COMMUNICATIONS

Successful communication between field teams and personnel is essential. The following communication systems will be available during site activities:

- Cellular telephones or two-way radios

The hand signals listed below will be used by site personnel in emergency situations or when verbal communication is difficult.

Signal	Definition
Hands clutching throat	Out of air or cannot breathe
Hands on top of head	Need assistance
Thumbs up	Okay, I am all right, or I understand
Thumbs down	No or negative
Arms waving upright	Send backup support
Gripping partner's wrist	Exit area immediately

### 9.1 SITE CONTROL ZONES

The following site control zones will be established for each property and work task.

#### 9.2.1 Zone 1: Exclusion Zone

An exclusion zone includes areas where contamination is either known or likely to be present or, because of work activity, has the potential to cause harm to personnel. Typically, these areas will be limited to attics and crawl spaces during the TAPE. The exclusion zone will be established before Tetra Tech employees access attic and crawl space areas to collect samples. Other building occupants and visitors will be restricted from entering the exclusion zone during sampling procedures. Work tasks that may require establishment of an exclusion zone include the following:

Task 1-- Interior sampling of VCI and LV in attics and crawl spaces.

Exclusion zones will not be established during collection of dust samples within other interior areas of buildings or during collection of soil samples outside the buildings. However, building occupants should be restricted from the immediate area during these procedures.

#### 9.2.2 Zone 2: Decontamination Zone

A decontamination zone is not expected during the TAPE project. Personal decontamination will entail removing of protective garments before field crews descend from attic areas or exiting crawl spaces. Tetra Tech personnel will use disposable wet wipes to wash respirators and exposed areas such as faces and hands before they exit the exclusion zones. Sampling equipment will be decontaminated at the sample locations. Decontamination procedures will consist of a water rinse or damp rag cleaning of equipment after each sample collected. The decontamination zone will contain facilities to decontaminate personnel and portable equipment. Equipment decontamination procedures are described in Section 10.0. All PPE will be placed in disposal bags and sealed before Tetra Tech employees exit the exclusion zones. Visitors will not be permitted to enter the decontamination zone without proper qualifications and Tetra Tech SSC authorization.



### 9.2.3 Zone 3: Support Zone

A support zone may consist of any uncontaminated and nonhazardous part of the site, such as at the base of ladders used to access attic spaces or outside of crawl space entrances. These areas will be covered with polyethylene sheeting during sampling in the exclusion zones. Sampling procedures will immediately stop if visible suspect asbestos-contaminated debris is observed outside of the sampling areas at any time during sampling after the exclusion zone has been established. Debris and residue will be cleaned up using appropriate HEPA vacuuming or wet cleaning procedures before work recommences. Site visitors who do not meet training, medical surveillance, and PPE requirements must stay outside of the support zone.

### 9.3 SITE ACCESS CONTROL

The study area during this project will not be one stationary location. Access to private residences will be permitted by the owner. Owners and occupants should be restricted from the immediate areas during sampling procedures. Typically, they should be asked to stay in adjacent rooms during sampling procedures.

### 9.4 SITE SAFETY INSPECTIONS

The Tetra Tech SSC will conduct periodic site safety inspections to maintain safe work areas and compliance with this HASP. Results of the site safety inspections will be recorded in the field logbook or on a Field Audit Checklist (Form AF-1 in Appendix A).

### 9.5 SAFE WORK PRACTICES

Various SWPs are applicable during the TAPE project. These SWPs are included in Appendix B to this HASP. The following SWPs apply to the site:

- SWP 6-1, General Safe Work Practices
- SWP 6-8, Safe Electrical Work Practices
- SWP 6-9, Fall Protection Practices

- SWP 6-10, Portable Ladder Safety
- SWP 6-15, Heat Stress
- SWP 6-16, Cold Stress
- SWP 6-27, Respirator Cleaning Procedures
- SWP 6-28, Safe Work Practices for Use of Respirators

## 10.0 DECONTAMINATION

Decontamination is the process of removing or neutralizing contaminants on personnel or equipment. When properly conducted, decontamination procedures protect workers from contaminants that may have accumulated on PPE, tools, and other equipment. Proper decontamination also prevents transport of potentially harmful materials to uncontaminated areas. Personnel and equipment decontamination procedures are described in the following sections.

### 10.1 PERSONNEL DECONTAMINATION

Personnel decontamination at the site will be limited by using disposable PPE whenever possible and by wet wiping of faces and hands after sampling procedures. Any personnel decontamination procedures will follow guidance in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (NIOSH and others 1985). Personnel and PPE will be decontaminated with potable water or a mixture of detergent and water. Disposable cloths or wet wipes will be placed in sealable baggies pending disposal.

### 10.2 EQUIPMENT DECONTAMINATION

Decontamination of all sampling, PPE, and field monitoring equipment used during site activities will be required. Decontamination of sampling equipment will be conducted at the sample locations. Decontamination procedures will consist of a water rinse or damp rag cleaning of equipment after each sample collected.

### 10.2.1 PPE and Monitoring Equipment

Used, disposable PPE will be collected in sealable containers and will be disposed of in accordance with procedures described in the project specific work plan. Personnel decontamination procedures may be modified as necessary while on site. All non-disposable PPE such as hard hats, respirators, and any exposed clothing will be washed at the end of each workday, or as necessary depending on working conditions, to remove all potential for asbestos contamination. Monitoring equipment used during sampling will be rinsed with water at the end of each workday, or as necessary to remove any contamination.

### 10.2.2 Sampling Equipment

Sampling equipment, such as knives and scissors, will be decontaminated before and after each use as described below.

- Decontamination procedures for sampling equipment will depend on the sampling location. Equipment such as knives and scissors will, in most sampling situations, be decontaminated by wiping down with damp cloths or rags. Soap and water may be necessary when items are excessively dirty but are not mandatory.
- Sampling equipment will be allowed to air-dry before the next use.

## 11.0 EMERGENCY RESPONSE PLANNING

This section describes emergency response planning procedures to be implemented for the site. This section is consistent with local, state, and federal disaster and emergency management plans. The following sections discuss pre-emergency planning, personnel roles and lines of authority, emergency recognition and prevention, evacuation routes and procedures, emergency contacts and notifications, hospital route directions, emergency medical treatment procedures, protective equipment failure, fire or explosion, weather-related emergencies, spills or leaks, emergency equipment and facilities, and reporting.

### 11.1 PRE-EMERGENCY PLANNING

All on-site employees will be trained in and reminded of the provisions of Section 11.0, site communication systems, and site evacuation routes during the prework briefing and daily tailgate safety meetings. The Tetra Tech SSC will review the emergency response provisions on a regular basis and will be revised, if necessary, to make certain that they are adequate and consistent with prevailing site conditions.

### 11.2 PERSONNEL ROLES AND LINES OF AUTHORITY

The Tetra Tech SSC has primary responsibility for responding to and correcting emergencies and for taking appropriate measures to maintain the safety of site personnel and the public. Possible actions may include evacuation of personnel from the site area. The SSC is also responsible for ensuring that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSC, within the parameters of their scopes of work.

Personnel are required to report all injuries, illnesses, spills, fires, and property damage to the SSC. The SSC must be notified of any on-site emergencies and is responsible for following the appropriate emergency procedures described in this section.

### 11.3 EMERGENCY RECOGNITION AND PREVENTION

Table 4-1 lists potential on-site chemical hazards, and Table 4-2 provides information on the hazards associated with the various tasks planned for the site. On-site personnel will be made familiar with this information and with techniques of hazard recognition through prework training and site-specific briefings.

### 11.4 EVACUATION ROUTES AND PROCEDURES

In the event of an emergency that necessitates evacuation of a work task area or the site, the Tetra Tech SSC will contact all nearby personnel using the on-site communication systems discussed in Section 9.1

to advise the personnel of the emergency. The personnel will proceed along site roads to a safe distance upwind from the source of the hazard. The personnel will remain in that area until the SSC or an authorized individual provides further instructions.

#### **11.5 EMERGENCY CONTACTS AND NOTIFICATIONS**

The emergency information before Section 1.0 of this HASP provides names and telephone numbers of emergency contact personnel. This page must be posted on site or must be readily available at all times. In the event of a medical emergency, personnel will notify the appropriate emergency organization and will take direction from the Tetra Tech SSC. The project team will follow procedures discussed in Section 11.9 or 11.11.

#### **11.6 HOSPITAL ROUTE DIRECTIONS**

Before site activities begin, Tetra Tech personnel will conduct a pre-emergency hospital run to familiarize themselves with the route to the local hospital. A map showing the hospital route is provided in the emergency information before Section 1.0 of this HASP.

#### **11.7 EMERGENCY MEDICAL TREATMENT PROCEDURES**

A person who becomes ill or injured during work may require decontamination. If the illness or injury is minor, any decontamination necessary will be completed and first aid should be administered before the patient is transported. If the patient's condition is serious, partial decontamination will be completed (such as complete disrobing of the person and redressing the person in clean coveralls or wrapping in a blanket). First aid should be administered until an ambulance or paramedics arrive. All injuries and illnesses must be reported immediately to the Tetra Tech project manager and HSR.

Any person transported to a clinic or hospital for chemical exposure treatment will be accompanied by information on the chemical he or she has been exposed to at the site, if possible. Table 4-1 contains this information.

#### **11.8 PROTECTIVE EQUIPMENT FAILURE**

If any worker in the exclusion zone experiences a failure of protective equipment (either engineering controls or PPE) that affects his or her personal protection, the worker and all coworkers will immediately leave the exclusion zone. Re-entry to the exclusion zone will not be permitted until (1) the

protective equipment has been repaired or replaced, (2) the cause of the equipment failure has been determined, and (3) the equipment failure is no longer considered to be a threat.

#### **11.9 FIRE OR EXPLOSION**

In the event of a fire or explosion on site, fire department will be immediately summoned. The Tetra Tech SSC or a site representative will advise the fire department of the location and nature of any hazardous materials involved. Appropriate provisions of Section 11.0 will be implemented by site personnel.

#### **11.10 WEATHER-RELATED EMERGENCIES**

Work will not be conducted during severe weather conditions, including high-speed winds or lightning. In the event of severe weather, field personnel will stop work, secure and lower all equipment, and leave the site.

Thermal stress caused by excessive heat or cold may occur as a result of extreme temperatures, workload, or the PPE used. Heat and cold stress treatment will be administered as described in SWPs 6-15 and 6-16.

#### **11.11 EMERGENCY EQUIPMENT AND FACILITIES**

The following emergency equipment will be available on site:

- First aid kit
- Fire extinguisher
- Site telephones, depending on location
- Mobile telephone
- Confined-space entry equipment, as necessary
- Fall protection equipment, as necessary

## 11.12 REPORTING

All emergencies require follow-up and reporting. Appendix A includes the Tetra Tech Accident and Illness Investigation Report (Form AR-1). This report must be completed and submitted to the Tetra Tech project manager within 24 hours of an emergency. The project manager will review the report and then forward it to the Tetra Tech HSR for review. The report must include proposed actions to prevent similar incidents from occurring. The HSR must be fully informed of the corrective action process so that she may implement applicable elements of the process at other sites.

## REFERENCES

- American Conference of Governmental Industrial Hygienists (ACGIH). "Threshold Limit Values and Biological Exposure Indices for 1998." Latest edition.
- National Institute for Occupational Safety and Health (NIOSH) and others. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October.
- NIOSH. 1997. "Pocket Guide to Chemical Hazards." U.S. Department of Health and Human Services. U.S. Government Printing Office. Washington, DC. June.
- Tetra Tech, Inc. 1999. "Health and Safety Manual."

#### **APPENDIX A**

##### **TETRA TECH FORMS**

(11 Sheets)

- Compliance Agreement (Form HSP-4)
- Daily Tailgate Safety Meeting (Form HST-2)
- Daily Site Log (Form SSC-1)
- Accident and Illness Investigation Report (Form AR-1)
- Field Audit Checklist (Form AF-1)

#### **APPENDIX B**

##### **SAFE WORK PRACTICES**

(38 Sheets)

- SWP 6-1 General Safe Work Practices
- SWP 6-9 Fall Protection Practices
- SWP 6-10 Portable Ladder Safety
- SWP 6-15 Heat Stress
- SWP 6-16 Cold Stress
- SWP 6-27 Respirator Cleaning Procedures
- SWP 6-28 Safe Work Practices for Use of Respirators

**APPENDIX C**

**RESPIRATORY HAZARD ASSESSMENT (FORM RP-2)**

(Two Sheets)

Note: This assessment form will be finalized if gasses or vapors are encountered  
and is not required for asbestos sampling.

**ATTACHMENT D**

**MATERIAL SAFETY DATA SHEETS**

(None Anticipated)